Problem Set 1 Solution

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17.881/882

1 Gibbons 1.1 (p.48)

'The Normal-form representation of an n-player game specifies the players' strategy spaces $S_1, S_2, ..., S_n$ and their payoff functions $u_1, u_2, ..., u_n$.

We denote this game $G = \{S_1, S_2, ..., S_n ; u_1, u_2, ..., u_n\}$ (Gibbons, p.4). In such a game, players choose their actions simultaneously.

(The timing issue is important and contrasts the normal-form representation of the game with an extensive-form representation).

A Strictly Dominated strategy in a Normal-Form Game is a strategy $s'_i$ such that there exists another strategy $s''_i$, with $s'_i, s''_i \in S_i$, with the property that for each feasible combination of the other players' strategies, $i$'s payoff from playing $s'_i$ is strictly less than $i$'s payoff from playing $s''_i$, i.e.

$$u_i(s_1, s_2, ..., s_{i-1}, s'_i, s_{i+1}, ..., s_n) < u_i(s_1, s_2, ..., s_{i-1}, s''_i, s_{i+1}, ..., s_n) \forall (s'_1, s'_2, ..., s'_{i-1}, s_{i+1}, ..., s'_n) \epsilon (S_1, S_2, ..., S_{i-1}, S_{i+1}, ..., S_n)$$

A Pure-Strategy Nash Equilibrium in a Normal-Form Game is the solution $(s'_1, ..., s'_n)$ to a normal-form game in which, for each player $i$, $s'_i$ is (at least tied for) player $i$'s best response to the strategies specified for the $n - 1$ other players (Gibbons, p.8)